

Epidural spinal cord stimulation enhances hindlimb motor function in SOD1 mice

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Amyotrophic Lateral Sclerosis (ALS) is a progressive neurodegenerative disease characterized by loss of motoneurons, paralysis, and eventual death from respiratory failure. While ALS is classically described as a “motor neuron disease”, emerging evidence suggests firing dysfunction from spinal 1a sensory afferent neurons precedes motor neuron degeneration, and may represent a novel target for disease modification. Epidural spinal cord stimulation delivers electrical stimulation to spinal 1a sensory neurons to enhance volitional motor control and restore movement in humans with paralysis from spinal cord injuries and cortical strokes. Potential applications of epidural spinal cord stimulation onto ALS have not been studied. We implanted epidural spinal cord stimulators in SOD1 mice, a well studied model of motor neuron degeneration. Over the course of four weeks, mice received four hours of stimulation, five days a week (treatment group). At the end of four weeks, treated mice demonstrated increased hindlimb EMG firing amplitude, increased functional performance on rotarods testing, and increased survival of spinal motor neurons when compared to untreated controls. Further work is needed to validate these findings in humans.